Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Original Research

Population perspective comparing COVID-19 to all and common causes of death during the first wave of the pandemic in seven European countries

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ABSTRACT

Objectives: Mortality statistics on the COVID-19 pandemic have led to widespread concern and fear. To contextualise these data, we compared mortality related to COVID-19 during the first wave of the pandemic across seven countries in Europe with all and common causes of death, stratifying by age and sex. We also calculated deaths as a proportion of the population by age and sex.

Study design: Analysis of population mortality data.

Methods: COVID-19 related mortality and population statistics from seven European countries were extracted: England and Wales, Italy, Germany, Spain, France, Portugal and Netherlands. Available data spanned 14–16 weeks since the first recorded deaths in each country, except Spain, where only comparable stratified data over an 8-week time period was available. The Global Burden of Disease database provided data on all deaths and those from pneumonia, cardiovascular disease combining ischaemic heart disease and stroke, chronic obstructive pulmonary disease, cancer, road traffic accidents and dementia in 2017.

Results: Deaths related to COVID-19, while modest overall, varied considerably by age. Deaths as a percentage of all cause deaths during the time period under study ranged from <0.01% in children in Germany, Portugal and Netherlands, to as high as 41.65% for men aged over 80 years in England and Wales. The percentage of the population who died from COVID-19 was less than 0.2% in every age group under the age of 80. In each country, over the age of 80, these proportions were: England and Wales 1.27% males, 0.87% females; Italy 0.6% males, 0.38% females; Germany 0.13% males, 0.09% females; France 0.39% males, 0.2% females; Portugal 0.2% males, 0.15% females; and Netherlands 0.6% males, 0.4% females.

Conclusions: Mortality rates from COVID-19 during the first wave of the pandemic were low including when compared to other common causes of death and are likely to decline further while control measures are maintained, treatments improve and vaccination is instituted. These data may help people to contextualise their risk and for decision-making by policymakers.

1. Background

The COVID-19 pandemic, calamitous though it is, needs to be placed in perspective. It has been 12 months since the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak was first identified [1], and deaths globally continue to rise. As of November 30, 2020, there have been an estimated 62, 195, 274 cases and 1,453,355 directly attributable deaths worldwide [2]. These are undoubtedly underestimates. These statistics have caused widespread concern and fear [3,4]. Some of this concern is clearly justified, but some – as we have demonstrated in children – is disproportionate, given that COVID-19 caused a small fraction of deaths in people under 18-years of age, even fewer than influenza [5].

Contextualising the impact of COVID-19 in relation to other causes of death, and to mortality rates in the population, helps to gain perspective. Total mortality related to COVID-19 is the most commonly reported

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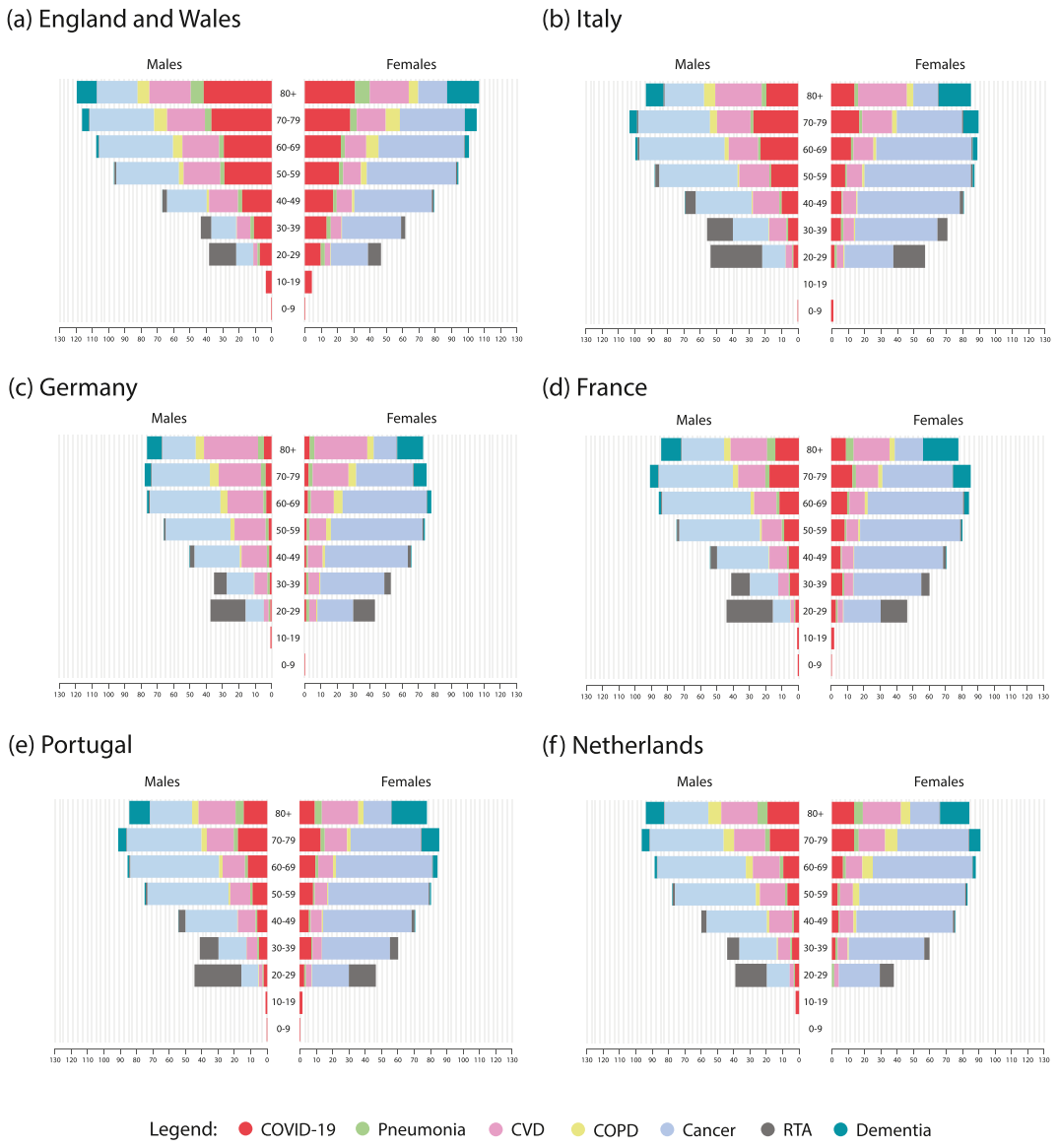

Fig. 1. Stacked bar charts showing mortality from seven causes of death as a percentage of all-cause deaths by age and sex in six European countries.

statistic, which has been invaluable in galvanising public health interventions [6]; however, given important differentials by age and sex, stratifying the mortality data is essential [7].

We report age- and sex-stratified mortality data related to COVID-19 and compare these with all-cause and common causes of mortality using data from the Global Burden of Disease (GBD) study [8]. We examined two perspectives: firstly, mortality from COVID-19 and other common causes of death as a fraction of all deaths, and secondly, as a fraction of the population.

2. Methods

We extracted population size and COVID-19 mortality by age and sex from the National Institute for Demographic Studies website [9] for the following countries: England and Wales, Italy, Germany, Spain, France, Portugal and Netherlands. These countries were selected due to data availability, reporting comparable age groupings stratified by sex, and comparability of location in Western Europe, with reasonably similar health care systems, economy and capacity to collect data. Available data spanned 14–16 weeks since the first recorded deaths in each country, except Spain, where only comparable stratified data over an 8-week time period was available. Furthermore, these countries have had high death rates given their average age of the population is high compared with low- and middle-income countries. These countries, therefore, exemplify the impact of the pandemic at the higher end of the scale of mortality. Most other countries, especially with younger populations, can anticipate lower mortality.

We extracted annual age- and sex-specific death counts from the Global Burden of Disease 2017 study [8] for all causes and pneumonia, cardiovascular disease combining ischaemic heart disease and stroke (CVD), chronic obstructive pulmonary disease (COPD), cancer, road traffic accidents (RTA) and dementia; these six causes were selected as they represent common causes of death in adults [10]. As we have already reported similar analyses in children and young people [5], and the causes of death are very different from adults, we only compare COVID-19 and all-cause mortality.

To compare mortality estimates from the GBD with those from COVID-19, mortality rates for non-COVID-19 causes for each country were adjusted based on the number of weeks that COVID-19 data were available for (Supplementary Table 1).

Data were analysed by country, age and sex with deaths related to COVID-19 and to other specific causes as a fraction of both all causes of

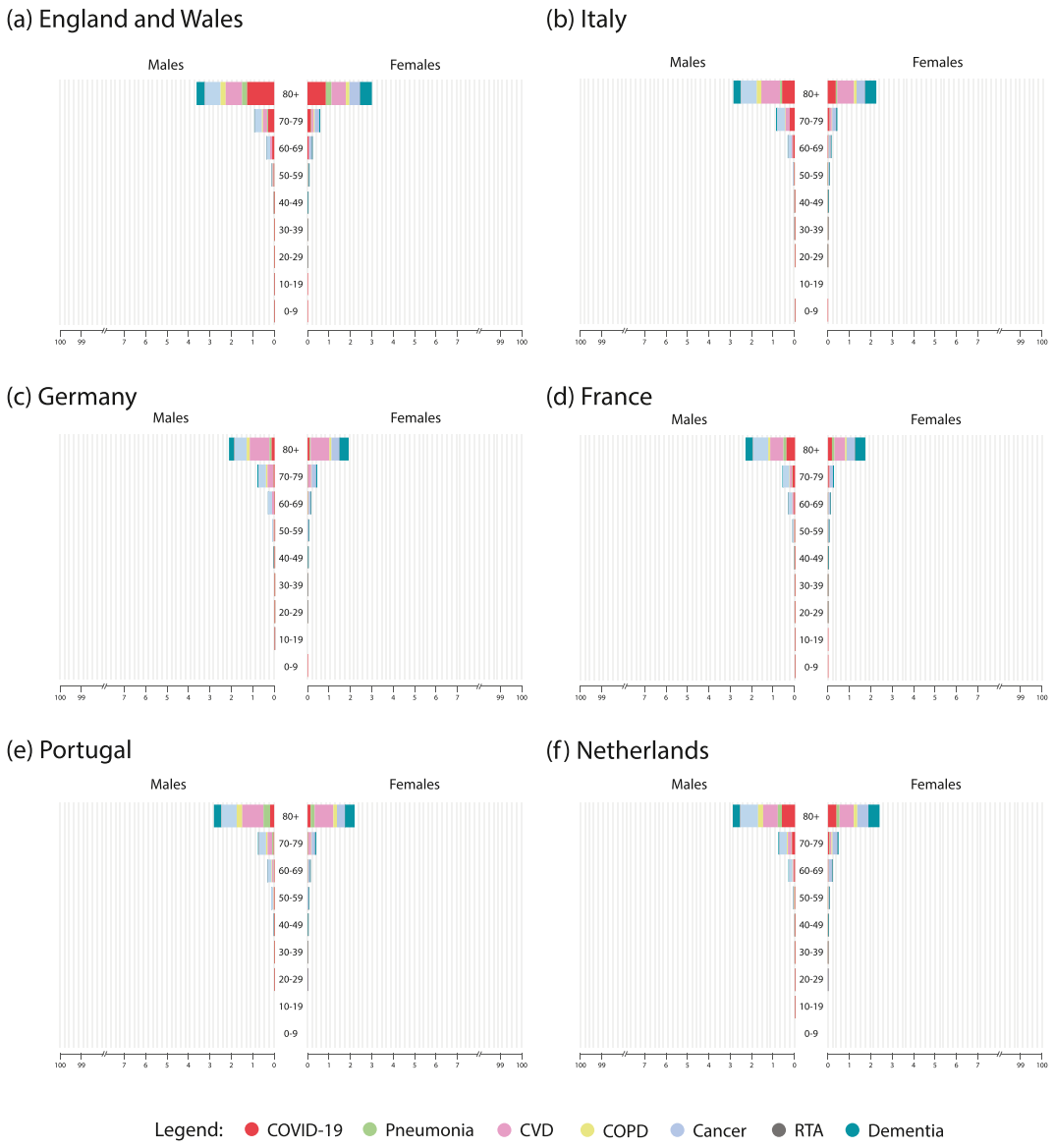

Fig. 2. Stacked bar charts showing mortality data from seven causes of death in six countries as a percentage of the population in each demographic group. Discontinuous x-axes are used.

death and population size. Data extraction and analysis was carried out by BO and checked independently by JB. Butterfly charts with stacked bars display these data graphically.

3. Results

Table 1 shows mortality by cause, age and sex in the seven countries from March 09, 2020 until July 09, 2020 (for specific dates see Supplementary Table 1) and the percentage of COVID-19 deaths and other causes of death with respect to all-cause mortality. Fig. 1 summarises these data.

Across all countries the number of deaths related to COVID-19 demonstrated a sharp increase with age, and there were greater numbers of deaths in males than females. Deaths related to COVID-19 represented a small proportion of all deaths overall, though this varied considerably by age being less than 0.01% in children in Germany, Portugal and Netherlands, and as high as 41.65% for men aged over 80 years in England and Wales. In groups under the age of 70, COVID-19 was never the commonest cause of death although it was an important contributor.

Fig. 2 shows the percentage of the population who died from COVID-19 and the six other causes (Supplementary Figure 1 provides continuous x-axes to 100%). These figures show that, cumulatively, mortality from the six common causes of death was less than 1% in every age group, except in those aged over 80 years, where this percentage ranged from 1 to 4%. The percentage of the population dying from COVID-19 was less than 0.2% in every age group under the age of 80 across all countries, less than or equal to 0.1% under the age of 70 and less than 0.04% under the age of 60. In each country, over the age of 80, these proportions were: England and Wales 1.27% males, 0.87% females; Italy 0.6% males, 0.38% females; Germany 0.13% males, 0.09% females; France 0.39% males, 0.2% females; Portugal 0.2% males, 0.15% females; and Netherlands 0.6% males, 0.4% females.

Graphical representation of the data from Spain are shown in Supplementary Figure 2, as these represent on an 8-week time period, compared to other countries, which represent data over 14–16 weeks.

4. Discussion

The COVID-19 pandemic is an international emergency warranting a

comprehensive, medical, public health and economic response [11]. Our methods and analyses provide a population perspective on the pandemic during the first wave in, some of the worst affected countries in the world. It is unlikely that the patterns will change in the second wave but they may in subsequent waves given successful vaccination programmes, which are likely to reduce mortality substantially in older age groups. These data show that the high level of mortality is primarily seen in older adults, particularly men. However, even in the most affected groups, other causes of death were more common than COVID-19, and in all groups under the age of 70, COVID-19 did not represent the most common cause of death. Our non-COVID-19 mortality data from the Global Burden of Disease 2017 study allowed us to estimate deaths for different age groups. Given the potential impact of lockdowns on access to healthcare, particularly for those with chronic conditions, it is likely that mortality patterns from these other causes will change in this pandemic year, most likely with increases in cardiovascular diseases and cancer but possibly reductions in infectious diseases including influenza.

These data also highlight the very small percentages of deaths related to COVID-19 relative to population size, representing less than 0.2% in all groups under the age of 80. Mortality related to the first wave of the COVID-19 pandemic in Europe mainly occurred during the months of March, April and May and was subsequently brought under greater control during the summer months. We cannot forecast population impact on mortality patterns of future and waves of the pandemic. We can see, however, the population impact on mortality during the first wave has been modest except in those over 80 years of age. In the immediate future, the relative proportions of deaths from COVID-19 compared to other causes in these European countries are likely to decline as control measures, while being relaxed, are likely to be applied partially and intermittently for some years. Better treatments and widespread vaccination are also likely to reduce COVID-19 mortality.

Mortality related to COVID-19 is known to be higher in males than in females and higher in older age groups and the mechanisms for these differential effects have been postulated [12,13]. Other important factors have also been recognised to lead to poorer outcomes following COVID-19 infection, including co-morbidity [14] and ethnicity, with data suggesting that ethnic minority groups are at increased risk of death from COVID-19[15]. Though these have not been analysed in this study, ensuring a holistic approach when determining and addressing risk is important.

We acknowledge limitations of this study. We found variations between countries in proportions of deaths but have not emphasised them as data collection factors may contribute to this. For example, the COVID-19 mortality data from France represented only in-hospital deaths, whereas England and Wales also counted community deaths, including hospices, care homes and patients' homes [9]. A further limitation is that data from Spain only represented an 8-week time span during the initial outbreak, as their data reporting methods changed beyond May [9], hindering access to comparable data since then. Defining COVID-19 mortality rates is also contentious, as data pertains to clinically apparent PCR-positive infections, underestimating true mortality [16]. Furthermore, there may be several reasons why the mortality totals exceed 100 in England and Wales, Italy and Spain. The GBD data may reflect death certificates that record more than one of the listed causes of death under study here, therefore leading to an overestimation of the cumulative totals. Without access to real-time mortality data on all causes, we are also unable to assess the ongoing effect of the pandemic on mortality related to other causes, such as cancer and cardiovascular disease, which may rise as healthcare resources have been both curtailed and diverted [17]. This analysis does not examine underlying comorbidities in people who died, which would provide further important perspectives for responding to the pandemic. Finally, morbidity from COVID-19 is clearly substantial but quantitative data in populations are not available and we were unable to replicate our work using morbidity data. Morbidity, both as a risk factor for mortality, and as a consequence of the infection is an important area for future research.

Our data from seven European countries provides an important public message for policymakers, healthcare workers and the public, who are trying to understand the impact of COVID-19 and the risk of dying. Other population-level studies have been conducted using UK data to contextualise these risks [18,19]. Misinformation has been a problem, perpetuating public fear and anxiety, impacting on the increasing burden of adverse mental health during the pandemic and even contributing to suicide risk [20,21].

By presenting and interpreting population perspectives on mortality related to COVID-19 compared with other common causes of death, stratified by age and sex, we have provided perspectives to allow policymakers, professionals and the media to tailor both communications and interventions to manage the pandemic, including the level of anxiety and fear provoked by previously published mortality statistics, primarily daily and cumulative totals. Similar analyses are required globally and for the duration of the pandemic. More research is required to incorporate morbidity to produce a broader perspective on the true health impact of COVID-19[15].

Funding

None.

Contributions

RB conceived the study. SB and JB developed the methodology, which was expanded by BO. BO carried out data extraction, which was checked independently by JB. BO carried out the data analysis. All authors contributed to the interpretation of the data. BO wrote the first draft of the manuscript, which was substantially edited by all authors. All authors approved the final version. All authors had access to the data and are responsible for data integrity and completeness.

Declaration of competing interest

None reported.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhip.2021.100077.

Table 1
Mortality data by country, cause, age and sex: specific causes of death, including COVID-19, are shown as raw data, percentage of all-cause deaths and percentage of population for each country's demographic group.

Country	Demographic group		Population (n)	All cause deaths (n)	COVID-19 deaths			Pneumonia deaths			CVD deaths			COPD deaths			Cancer deaths			RTA deaths			Dementia deaths		
					n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group
England and Wales	0–9	M	3701011	555	2	0.36	0																			
		F	3522739	429	1	0.23	0																			
	10–19	M	3448335	189	7	3.7	0																			
		F	3273242	111	5	4.5	0																			
	20–29	M	3954548	633	46	7.27	0	9	1.42	0	17	2.69	0	1	0.16	0	66	10.43	0	104	16.43	0	0	0	0
		F	3785684	277	27	9.75	0	7	2.53	0	9	3.25	0	1	0.36	0	63	22.74	0	22	7.94	0	0	0	0
	30–30	M	3920605	1085	121	11.15	0	23	2.12	0	91	8.39	0	4	0.37	0	163	15.02	0	69	6.36	0	0	0	0
		F	3956326	627	85	13.56	0	15	2.39	0	40	6.38	0	3	0.48	0	228	36.36	0.01	15	2.39	0	0	0	0
	40–49	M	3749942	2349	427	18.18	0.01	59	2.51	0	422	17.97	0.01	29	1.23	0	574	24.44	0.02	63	2.68	0	4	0.17	0
		F	3815410	1519	263	17.31	0.01	37	2.44	0	141	9.28	0	21	1.38	0	720	47.4	0.02	16	1.05	0	5	0.33	0
	50–59	M	3906270	5142	1491	29	0.04	130	2.53	0	1167	22.7	0.03	149	2.9	0	1963	38.18	0.05	56	1.09	0	27	0.53	0
		F	4016425	3667	777	21.19	0.02	90	2.45	0	395	10.77	0.01	134	3.65	0	2006	54.7	0.05	18	0.49	0	32	0.87	0
	60–69	M	3041563	10620	3149	29.65	0.1	287	2.7	0.01	2372	22.34	0.08	644	6.06	0.02	4794	45.14	0.16	45	0.42	0	153	1.44	0.01
		F	3199239	7442	1647	22.13	0.05	200	2.69	0.01	954	12.82	0.03	559	7.51	0.02	3921	52.69	0.12	20	0.27	0	175	2.35	0.01
	70–79	M	2308296	18924	7027	37.13	0.3	719	3.8	0.03	4380	23.15	0.19	1514	8	0.07	7474	39.49	0.32	45	0.24	0	839	4.43	0.04
		F	2576981	14771	4137	28.01	0.16	600	4.06	0.02	2594	17.56	0.1	1296	8.77	0.05	5840	39.54	0.23	31	0.21	0	1054	7.14	0.04
	80+	M	1184681	36116	15044	41.65	1.27	2959	8.19	0.25	9066	25.1	0.77	2697	7.47	0.23	8939	24.75	0.75	55	0.15	0	4461	12.35	0.38
		F	1754512	49714	15351	30.88	0.87	4376	8.8	0.25	11892	23.92	0.68	2962	5.96	0.17	8753	17.61	0.5	50	0.1	0	9657	19.43	0.55
Italy	0–9	M	2617094	297	1	0.34	0																			
		F	2473388	230	3	1.3	0																			
	10–19	M	2980600	177	0	0	0																			
		F	2788274	82	0	0	0																			
	20–29	M	3212204	413	12	2.91	0	4	0.97	0	15	3.63	0	1	0.24	0	59	14.29	0	131	31.72	0	0	0	0
		F	2989066	170	4	2.35	0	2	1.18	0	7	4.12	0	1	0.59	0	51	30	0	33	19.41	0	0	0	0
	30–30	M	3559151	692	43	6.21	0	8	1.16	0	71	10.26	0	3	0.43	0	152	21.97	0	110	15.9	0	0	0	0
		F	3515067	372	23	6.18	0	5	1.34	0	25	6.72	0	2	0.54	0	188	50.54	0.01	22	5.91	0	0	0	0
	40–49	M	4593789	2062	213	10.33	0	24	1.16	0	335	16.25	0.01	15	0.73	0	709	34.38	0.02	135	6.55	0	3	0.15	0
		F	4648865	1308	83	6.35	0	11	0.84	0	110	8.41	0	9	0.69	0	818	62.54	0.02	28	2.14	0	4	0.31	0
	50–59	M	4578610	5339	893	16.73	0.02	62	1.16	0	974	18.24	0.02	63	1.18	0	2555	47.86	0.06	132	2.47	0	26	0.49	0
		F	4773621	3242	281	8.67	0.01	35	1.08	0	307	9.47	0.01	38	1.17	0	2119	65.36	0.04	37	1.14	0	30	0.93	0
	60–69	M	3511037	11244	2600	23.12	0.07	150	1.33	0	2052	18.25	0.06	262	2.33	0.01	5898	52.45	0.17	113	1	0	166	1.48	0
		F	3826173	6537	811	12.41	0.02	84	1.28	0	797	12.19	0.02	132	2.02	0	3804	58.19	0.1	47	0.72	0	196	3	0.01
	70–79	M	2727000	22667	6201	27.36	0.23	406	1.79	0.01	4701	20.74	0.17	940	4.15	0.03	9940	43.85	0.36	171	0.75	0.01	1124	4.96	0.04
		F	3235533	15600	2708	17.36	0.08	249	1.6	0.01	2908	18.64	0.09	457	2.93	0.01	6217	39.85	0.19	86	0.55	0	1488	9.54	0.05
	80+	M	1605281	48987	9581	19.56	0.6	1358	2.77	0.08	14039	28.66	0.87	3230	6.59	0.2	11900	24.29	0.74	313	0.64	0.02	5409	11.04	0.34
		F	2724793	72006	10279	14.28	0.38	1637	2.27	0.06	21594	29.99	0.79	2737	3.8	0.1	11038	15.33	0.41	313	0.43	0.01	14119	19.61	0.52
Germany	0–9	M	3896272	469	0	0	0																			
		F	3692363	377	1	0.27	0																			
	10–19	M	3987129	245	2	0.82	0																			
		F	3718528	135	0	0	0																			
	20–29	M	5110948	763	6	0.79	0	8	1.05	0	22	2.88	0	2	0.26	0	85	11.14	0	163	21.36	0	0	0	0
		F	4689659	288	3	1.04	0	5	1.74	0	13	4.51	0	2	0.69	0	63	21.88	0	38	13.19	0	0	0	0
	30–30	M	5437398	1258	17	1.35	0	16	1.27	0	99	7.87	0	5	0.4	0	207	16.45	0	103	8.19	0	0	0	0
		F	5209047	617	6	0.97	0	9	1.46	0	41	6.65	0	3	0.49	0	244	39.55	0	23	3.73	0	0	0	0
	40–49	M	5251175	3406	53	1.56	0	49	1.44	0	532	15.62	0.01	36	1.06	0	937	27.51	0.02	108	3.17	0	5	0.15	0
		F	5175082	1892	22	1.16	0	22	1.16	0	166	8.77	0	25	1.32	0	967	51.11	0.02	29	1.53	0	5	0.26	0
	50–59	M	6767896	11228	236	2.1	0	185	1.65	0	2162	19.26	0.03	274	2.44	0	4420	39.37	0.07	146	1.3	0	41	0.37	0
		F	6706270	5985	85	1.42	0	88	1.47	0	622	10.39	0.01	182	3.04	0	3361	56.16	0.05	42	0.7	0	43	0.72	0
	60–69	M	4987359	19577	641	3.27	0.01	400	2.04	0.01	4256	21.74	0.09	881	4.5	0.02	8473	43.28	0.17	105	0.54	0	228	1.16	0
		F	5315052	10993	229	2.08	0	197	1.79	0	1568	14.26	0.03	561	5.1	0.01	5686	51.72	0.11	41	0.37	0	248	2.26	0
	70–79	M	3503497	35800	1372	3.83	0.04	1011	2.82	0.03	9333	26.07	0.27	1883	5.26	0.05	12722	35.54	0.36	123	0.34	0	1463	4.09	0.04
		F	4182432	25405	667	2.63	0.02	591	2.33	0.01	5609	22.08	0.13	1177	4.63	0.03	8915	35.09	0.21	74	0.29	0	2014	7.93	0.05
	80+	M	2025017	56548	2673	4.73	0.13	2077	3.67	0.1	18661	33	0.92	2855	5.05	0.14	11747	20.77	0.58	109	0.19	0.01	5192	9.18	0.26

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Table 1 (*continued*)

Country	Demographic group		Population (n)	All cause deaths (n)	COVID-19 deaths			Pneumonia deaths			CVD deaths			COPD deaths			Cancer deaths			RTA deaths			Dementia deaths		
					n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group
		F	3364089	89167	3030	3.4	0.09	2357	2.64	0.07	28968	32.49	0.86	3579	4.01	0.11	12535	14.06	0.37	102	0.11	0	14124	15.84	0.42
Spain	0–9	M	2251517	137	1	0.73	0																		
		F	2119341	107	1	0.93	0																		
	10–19	M	2520800	60	3	5	0																		
		F	2362647	35	2	5.71	0																		
	20–29	M	2464472	148	15	10.14	0	2	1.35	0	7	4.73	0	1	0.68	0	21	14.19	0	37	25	0	0	0	0
		F	2383466	63	9	14.29	0	1	1.59	0	3	4.76	0	0	0	0	16	25.4	0	9	14.29	0	0	0	0
	30–30	M	3076176	333	42	12.61	0	5	1.5	0	37	11.11	0	3	0.9	0	69	20.72	0	40	12.01	0	0	0	0
		F	3091412	173	21	12.14	0	3	1.73	0	12	6.94	0	1	0.58	0	79	45.66	0	8	4.62	0	0	0	0
	40–49	M	3943490	1028	140	13.62	0	17	1.65	0	167	16.25	0	11	1.07	0	341	33.17	0.01	48	4.67	0	2	0.19	0
		F	3869686	550	77	14	0	7	1.27	0	46	8.36	0	5	0.91	0	322	58.55	0.01	10	1.82	0	2	0.36	0
	50–59	M	3457353	2685	465	17.32	0.01	42	1.56	0	463	17.24	0.01	55	2.05	0	1310	48.79	0.04	42	1.56	0	11	0.41	0
		F	3516656	1295	191	14.75	0.01	18	1.39	0	125	9.65	0	22	1.7	0	817	63.09	0.02	13	1	0	13	1	0
	60–69	M	2543236	4709	1282	27.22	0.05	78	1.66	0	798	16.95	0.03	206	4.37	0.01	2448	51.99	0.1	34	0.72	0	69	1.47	0
		F	2738641	2102	540	25.69	0.02	34	1.62	0	263	12.51	0.01	58	2.76	0	1152	54.8	0.04	14	0.67	0	80	3.81	0
	70–79	M	1771960	7506	3321	44.24	0.19	179	2.38	0.01	1386	18.47	0.08	576	7.67	0.03	3133	41.74	0.18	34	0.45	0	359	4.78	0.02
		F	2128590	4388	1565	35.67	0.07	93	2.12	0	757	17.25	0.04	163	3.71	0.01	1547	35.26	0.07	17	0.39	0	527	12.01	0.02
	80+	M	1060385	17826	6339	35.56	0.6	751	4.21	0.07	4075	22.86	0.38	1983	11.12	0.19	4200	23.56	0.4	40	0.22	0	2046	11.48	0.19
		F	1800567	24941	6522	26.15	0.36	878	3.52	0.05	6178	24.77	0.34	1620	6.5	0.09	3407	13.66	0.19	29	0.12	0	5352	21.46	0.3
France	0–9	M	3957228	516	2	0.39	0																		
		F	3798527	401	1	0.25	0																		
	10–19	M	4266196	222	2	0.9	0																		
		F	4062792	114	2	1.75	0																		
	20–29	M	3737191	662	14	2.11	0	4	0.6	0	15	2.27	0	1	0.15	0	69	10.42	0	191	28.85	0.01	0	0	0
		F	3733717	251	7	2.79	0	3	1.2	0	8	3.19	0	1	0.4	0	57	22.71	0	41	16.33	0	0	0	0
	30–30	M	4025803	1081	55	5.09	0	11	1.02	0	68	6.29	0	2	0.19	0	186	17.21	0	125	11.56	0	0	0	0
		F	4262454	504	35	6.94	0	5	0.99	0	28	5.56	0	1	0.2	0	210	41.67	0	25	4.96	0	0	0	0
	40–49	M	4233782	2698	158	5.86	0	31	1.15	0	291	10.79	0.01	13	0.48	0	858	31.8	0.02	108	4	0	4	0.15	0
		F	4350667	1445	82	5.67	0	14	0.97	0	102	7.06	0	7	0.48	0	786	54.39	0.02	26	1.8	0	4	0.28	0
	50–59	M	4294564	6914	617	8.92	0.01	100	1.45	0	835	12.08	0.02	73	1.06	0	3439	49.74	0.08	90	1.3	0	25	0.36	0
		F	4490542	3563	291	8.17	0.01	44	1.23	0	257	7.21	0.01	36	1.01	0	2184	61.3	0.05	30	0.84	0	29	0.81	0
	60–69	M	3792182	13799	1630	11.81	0.04	245	1.78	0.01	1896	13.74	0.05	295	2.14	0.01	7487	54.26	0.2	77	0.56	0	182	1.32	0
		F	4207424	6925	677	9.78	0.02	107	1.55	0	640	9.24	0.02	122	1.76	0	4067	58.73	0.1	39	0.56	0	206	2.97	0
	70–79	M	2598072	16729	2989	17.87	0.12	430	2.57	0.02	2782	16.63	0.11	506	3.02	0.02	7641	45.68	0.29	64	0.38	0	835	4.99	0.03
		F	3095588	10423	1354	12.99	0.04	228	2.19	0.01	1437	13.79	0.05	246	2.36	0.01	4499	43.16	0.15	39	0.37	0	1109	10.64	0.04
	80+	M	1492161	40808	5864	14.37	0.39	2049	5.02	0.14	9166	22.46	0.61	1630	3.99	0.11	10548	25.85	0.71	96	0.24	0.01	5037	12.34	0.34
		F	2664813	60011	5456	9.09	0.2	2691	4.48	0.1	13366	22.27	0.5	1900	3.17	0.07	10404	17.34	0.39	99	0.16	0	12925	21.54	0.49
Portugal	0–9	M	458227	56	0	0	0																		
		F	438988	40	0	0	0																		
	10–19	M	543042	34	0	0	0																		
		F	520053	19	0	0	0																		
	20–29	M	545347	93	1	1.08	0	2	2.15	0	2	2.15	0	0	0	0	12	12.9	0	27	29.03	0	0	0	0
		F	540688	28	1	3.57	0	1	3.57	0	1	3.57	0	0	0	0	7	25	0	4	14.29	0	0	0	0
	30–30	M	610964	160	1	0.63	0	4	2.5	0	10	6.25	0	1	0.63	0	29	18.13	0	19	11.88	0	0	0	0
		F	650915	94	1	1.06	0	2	2.13	0	5	5.32	0	1	1.06	0	40	42.55	0.01	4	4.26	0	0	0	0
	40–49	M	750095	578	10	1.73	0	16	2.77	0	71	12.28	0.01	5	0.87	0	190	32.87	0.03	28	4.84	0	1	0.17	0
		F	826398	291	10	3.44	0	6	2.06	0	26	8.93	0	3	1.03	0	155	53.26	0.02	7	2.41	0	1	0.34	0
	50–59	M	696521	1417	38	2.68	0.01	39	2.75	0.01	233	16.44	0.03	23	1.62	0	655	46.22	0.09	34	2.4	0	5	0.35	0
		F	782400	617	17	2.76	0	15	2.43	0	70	11.35	0.01	8	1.3	0	351	56.89	0.04	9	1.46	0	5	0.81	0
	60–69	M	595393	2456	102	4.15	0.02	81	3.3	0.01	476	19.38	0.08	76	3.09	0.01	1147	46.7	0.19	31	1.26	0.01	30	1.22	0.01
		F	691534	1203	46	3.82	0.01	36	2.99	0.01	194	16.13	0.03	26	2.16	0	597	49.63	0.09	11	0.91	0	35	2.91	0.01
	70–79	M	415892	4032	190	4.71	0.05	218	5.41	0.05	950	23.56	0.23	210	5.21	0.05	1459	36.19	0.35	30	0.74	0.01	165	4.09	0.04
		F	548704	2900	125	4.31	0.02	131	4.52	0.02	712	24.55	0.13	108	3.72	0.02	887	30.59	0.16	15	0.52	0	245	8.45	0.04
	80+	M	236885	8133	478	5.88	0.2	735	9.04	0.31	2329	28.64	0.98	603	7.41	0.25	1715	21.09	0.72	28	0.34	0.01	788	9.69	0.33
		F	424571	11756	626	5.32	0.15	843	7.17	0.2	3740	31.81	0.88	669	5.69	0.16	1558	13.25	0.37	24	0.2	0.01	1942	16.52	0.46

(*continued on next page*)

Table 1 (*continued*)

Country	Demographic group		Population (n)	All cause deaths (n)	COVID-19 deaths			Pneumonia deaths			CVD deaths			COPD deaths			Cancer deaths			RTA deaths			Dementia deaths		
					n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group	n	% of all cause deaths	% died in this group
Netherlands	0–9	M	913891	117	0	0	0																			
		F	869613	93	0	0	0																			
	10–19	M	1027835	47	1	2.13	0																			
		F	980499	30	0	0	0																			
	20–29	M	1117353	126	3	2.38	0	1	0.79	0	3	2.38	0	0	0	0	18	14.29	0	24	19.05	0	0	0	0
		F	1084435	68	0	0	0	1	1.47	0	2	2.94	0	0	0	0	17	25	0	6	8.82	0	0	0	0
	30–30	M	1060110	184	8	4.35	0	2	1.09	0	14	7.61	0	1	0.54	0	42	22.83	0	14	7.61	0	0	0	0
		F	1048089	132	3	2.27	0	2	1.52	0	8	6.06	0	1	0.76	0	61	46.21	0.01	4	3.03	0	0	0	0
	40–49	M	1127000	501	16	3.19	0	6	1.2	0	70	13.97	0.01	6	1.2	0	186	37.13	0.02	15	2.99	0	1	0.2	0
		F	1134107	387	15	3.88	0	4	1.03	0	33	8.53	0	7	1.81	0	228	58.91	0.02	5	1.29	0	1	0.26	0
	50–59	M	1258588	1466	102	6.96	0.01	24	1.64	0	228	15.55	0.02	34	2.32	0	726	49.52	0.06	18	1.23	0	7	0.48	0
		F	1249800	1208	44	3.64	0	17	1.41	0	95	7.86	0.01	50	4.14	0	783	64.82	0.06	8	0.66	0	8	0.66	0
	60–69	M	1038005	3418	334	9.77	0.03	70	2.05	0.01	563	16.47	0.05	149	4.36	0.01	1845	53.98	0.18	19	0.56	0	49	1.43	0
		F	1051908	2419	167	6.9	0.02	45	1.86	0	244	10.09	0.02	156	6.45	0.01	1469	60.73	0.14	10	0.41	0	46	1.9	0
	70–79	M	730336	5852	1047	17.89	0.14	177	3.02	0.02	1099	18.78	0.15	391	6.68	0.05	2637	45.06	0.36	27	0.46	0	268	4.58	0.04
		F	791774	4254	588	13.82	0.07	120	2.82	0.02	690	16.22	0.09	321	7.55	0.04	1851	43.51	0.23	16	0.38	0	290	6.82	0.04
	80+	M	307968	9555	1861	19.48	0.6	566	5.92	0.18	2131	22.3	0.69	754	7.89	0.24	2548	26.67	0.83	36	0.38	0.01	1074	11.24	0.35
		F	490852	14006	1943	13.87	0.4	743	5.3	0.15	3242	23.15	0.66	819	5.85	0.17	2518	17.98	0.51	26	0.19	0.01	2535	18.1	0.52

Abbreviations: COVID-19, coronavirus disease 2019; COPD, chronic obstructive pulmonary disease; CVD, cardiovascular disease; RTA, road traffic accident.

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